

Indian Pharma Industry: Decades of Struggle and Achievements

Presentation by
Dr. Y. K. Hamied
Chairman, Cipla Ltd.

on the occasion of
Dr. A. V. Rama Rao's 70th birthday
2nd April 2005, Hyderabad



4th March 1984
Inauguration of the Cipla Patalganga Factory

Mrs. Luba Hamied (wife of Cipla's Founder, Dr. K. A. Hamied), Dr. G. S. Sidhu (Director General, CSIR), Dr. Yusuf K. Hamied (Managing Director, Cipla), Dr. A. V. Rama Rao (Director, IICT, Hyderabad).

The background photograph taken at the opening ceremony of Cipla, Bombay Central on 22nd September 1937 shows Sir Shanti Swarup Bhatnagar (Founder Director General, CSIR), Sir Ramaswamy Mudaliar (Secretary, Planning Commission) & Dr. K. A. Hamied (Founder, Cipla).

Ladies and Gentlemen:

It is a unique privilege to address this audience on the occasion of Dr. A.V. Rama Rao's 70th birthday today. Our long friendship has often made me wonder whether one can ask God for a greater boon than a good friend. I am reminded of this forcefully not only today but every time we meet. Time has not changed him or his enthusiasm. He is as vibrant today as he was over 30 years ago. When we first met in 1972 he was a senior scientist at NCL, Pune having earlier completed his PhD in 1964 under Dr. Venkataraman. It was in that period that the Indian Patents Act, 1970 came into existence. It was truly the beginning of the Golden Age of the Indian Pharma Industry.

I believe I was invited to speak today because of the many similarities between Dr. Rama Rao and myself. We are approximately the same age. In fact, my company Cipla was inaugurated in 1935 and is also 70 years old. We did our Doctorates in organic chemistry and both our subjects were on organic pigments. We both shared and continue to share the important concept that what is best for India is self-reliance and self-sufficiency. The Father of our Nation, Mahatma Gandhi visited Cipla in 1939 and urged us to produce medicines for the Indo-British war effort. This was because the import of medicines had totally stopped from Europe and he instilled in us our belief in self-reliance. The late Dr. G. S. Sidhu, Director General of the CSIR once said,

“No one will sell you the technology of tomorrow – not even that of today. The moment you purchase technology, you are already in the field of obsolescence by five years or so”.

Apart from this, we both have always believed that the foundation and backbone of the pharma industry is the manufacture and availability of active pharmaceutical ingredients known as API's.

Our views way back in the early 70s on the complex and challenging patents issue were also similar. We both accepted that an inventor should be suitably rewarded but that there should be no monopolies in priority and need-based areas such as health and food, not only in India but also in all third world countries. In 1981, our late Prime Minister, Smt. Indira Gandhi said at WHO "My idea of a better ordered world is one in which medical discoveries would be free of patents and there would be no profiteering from life or death.

After due deliberation, I thought it best to present to you today, a brief overview of the role played by Dr. Rama Rao in the shaping of the indigenous pharma industry and his vision and drive for universal healthcare through the availability of efficacious and affordable medicines of outstanding quality. To do this, it is necessary for me to recall some historical perspectives of the Indian pharma industry.

The development of this industry started during the British rule in India and was primarily due to indigenous efforts. In 1892, Dr. P.C. Ray set up Bengal Chemicals and Pharmaceutical Works, later incorporated in 1901. This was followed by the establishment of Alembic Chemical Works in 1907 and Bengal Immunity in 1919. Prior to the Second World War many indigenous companies were started such as Calcutta Chemicals, Standard Pharmaceuticals, East India Pharmaceuticals and Cipla. Companies that came up

subsequently included Unichem, Indo-Pharma, Chemo-Pharma, Sarabhai, etc. At the same time a few multinational companies, taking advantage of the prevailing Indian Patents Act 1911, also started companies in India initially for importation and trading, but later for the manufacture of drugs as well, based on importation of actives. These companies included Glaxo, Boots, Burroughs Wellcome, Parke Davis, Lederle, Merck, Ciba, Hoechst, Roche, Wyeth, etc.

Prior to the Second World War, there was virtually no basic drug manufacture in the country. The Therapeutic Drug Revolution as we know it took place in the late 1920's with the introduction of Sulpha drugs in the early 1930's and Penicillin in the early 1940's and perhaps also the first synthetic antibiotic Chloramphenicol in 1948. The advent of the Second World War increased the demand for drugs and production and marketing began to be organized on a global scale by multinational corporations. Initially, the international pharma industry comprised of manufacturers rather than discoverers or inventors. With the passage of time this trend changed. However, in India the therapeutic revolution was alien and had no relevance. There was no research in new drug development. India, however did start producing a number of important natural products such as Quinine, Emetine, Strychnine and Morphine as well as synthetic drugs like Nikethamide. Post independence in 1947, many indigenous private and public sector companies were set up. The latter included Hindustan Antibiotics in 1954 and IDPL in 1961. Also, in 1961 Ranbaxy, as we know it today, was started. The state of the Indian Pharma Industry prior to 1972 and its subsequent growth is shown in the Annexures.

When I joined the pharma industry in 1960, the label “MADE IN INDIA”, was not acceptable internationally. India's Pharma exports were negligible and multinationals dominated the Indian domestic scene. In 1960 itself, I was influenced by a publication in 1959 of Prof. R.N. Chakravorthy, who discovered the existence of Dioscoria species in Northern India, which yielded Diosgenin, the precursor to steroids. As some of these such as Testosterone and Progesterone were not covered under existing patents, they could be produced within the country. Thus started the synthetic API manufacture in my Company.

Some of us strongly believed at the time that the Patents Act 1911 had to be modified. We formed the Indian Drug Manufacturers Association called IDMA in 1961 for the sole purpose of boosting the National Sector Pharma Industry. We fought for 11 years to amend the draconic Patent Laws then prevailing in India. Even at that time, we never opposed patents. We opposed monopoly. Our efforts culminated in the enactment of the Indian Patents Act 1970, passed in September 1972. This specifically, targeted the two vital areas of health and food, which were India's primary needs at that time and even today. India abolished product patents in these areas, but kept process patents for a period of 7 years. This Act, de facto, gave the Indian pharma industry the legal right and freedom to manufacture and market within our country almost any drug that was available internationally. It was the dawn of a Golden Age for the indigenous pharma industry.

Compared to its present status, the pharma industry was in its infancy in the early 1970s. From a turnover of Rs 100 million in 1947 and Rs 3600 million in 1972, drug formulation

production today is Rs 280,000 million (approximately US\$ 6.5 billion). This is just over 1% of the world pharma market in value, but around 12% in volume. Large scale manufacture of API's was started by the national sector in the mid 1970s and accelerated in the 1980s. During the same period, production of API's increased from Rs 900 million to over Rs 78000 million. India became self-sufficient in pharmaceuticals. By the late 1980's, imports accounted for a small percentage of the total pharma output. The development of the export sector has been a major achievement of the indigenous pharma industry. From a meager US\$ 48 million in 1973-74, total exports of pharmaceuticals today is in excess of US\$ 3 billion.

In 1971, the MNC's controlled over 70% of the domestic pharma market. Out of the leading 50 pharma companies in India, 33 were foreign. My company Cipla did not feature among them. I am mentioning all this, as it was prior to Cipla's and my personal association with Dr Rama Rao.

I would also like to show you the ranking of companies in 1996 and in 2004. The major change being that in 1996, the number of multinational companies in the top 50 had gone down to 22 and in 2004 further decreased to 13. The market share of the MNC's is now below 23%. During the past 30 years, there has been a significant change in the industry, in that indigenous companies now occupy a dominant position.

The consolidated efforts of all concerned has led to the Indian Pharma label now no longer considered inferior, but equal to the world's best. Today, it stands for quality, trust and respectability – an achievement for which all Indians

should be proud. Let us pay tribute to some of the pioneers who had struggled to raise the standards of the pharma industry to the present day level – Bhupen Dey and U.P. Basu in Calcutta, Dr. K. A. Hamied, Dr. Nanji, and A.V. Mody in Bombay, Sarabhai and Amin in Gujarat, S.K. Borkar and Dr Parvinder Singh in Delhi, among a host of others.

During the above period, 1960 to 1970, Dr. Rama Rao was involved in academic and fundamental research. However, in 1970 he developed a process to produce Saccharin and around that time also synthesized the anti-diabetic drug, Tolbutamide starting from a by-product of Saccharin manufacture. He personally felt the need at NCL to initiate a program in synthetic drugs development under the Directorship of Dr. B. D. Tilak. When we first met in early 1972, Cipla was trying to expand its API manufacturing unit in Mumbai. He had developed a novel synthesis for the tranquilizer, Diazepam. Within two weeks of our initial meeting, I visited NCL and after a very short discussion with Dr. Tilak and Dr. Rama Rao, Cipla licensed the technology transfer of Diazepam from NCL for a one time fee of Rs.30,000.

Even at that time, I believed that a laboratory such as NCL and other similar laboratories under CSIR should do whatever they were best at, namely lab scale work and leave the scaling-up and commercial manufacture to industry. I also insisted that industry should license technologies from NCL on a non-exclusive basis and they did release their Diazepam technology to other pharma companies. This was the start of a very useful and productive partnership between Dr. Rama Rao and the pharma industry. Our collective effort in the post Indian Patents Act 1970 era laid the foundation on

which was built the API manufacturing industry as it exists today.

Our aim at that time was essentially to produce important and critical drugs in India, which were marketed internationally, but not available in our country. The emphasis was on manufacturing the actives and their formulations, bioequivalent to the originator brand and making them available at affordable prices.

From 1975 to 1977, Dr. Rama Rao pursued his basic research interest under Prof. Corey in the USA. On his return to India in 1978, he resumed his career at NCL. He was also associated with Cipla as a scientific and industrial consultant. It was around that time that he developed for Cipla a unique process for the manufacture of the anti-asthmatic drug, Salbutamol. NCL also worked with us on the process development of Sulphamethoxazole and Trimethoprim. The next project was the synthesis of Ibuprofen. It is worth mentioning that Dr. Rama Rao always attempted to synthesize the end molecule by unconventional means, what we know today as reverse engineering. One very important project that Dr. Rama Rao undertook in 1979 was the isolation of the anti-cancer drug Vinblastine from Vinca Rosea leaf and the conversion of this to another valuable anti-cancer drug Vincristine – a project that was funded by the Maharashtra Government. Initially, we at Cipla were reluctant to take up this project. Dr. Rama Rao was very persuasive and convinced us. We implemented this successfully in 1983 and donated the first Vincristine vials produced to leading cancer hospitals in the country. We sold these at a quarter of the price of the imported vials. Around that time, Dr. Rama Rao had also

developed an excellent synthesis for Vitamin B₆. He worked on Beta-Blockers as well, namely Atenolol, Metoprolol and chiral Timolol. During his tenure at NCL up to 1985 as Deputy Director and Head of the Organic Chemistry Division, this type of industrial R&D and technology transfer flourished.

Dr. Rama Rao moved to Hyderabad as Director, RRL in 1985. He brought with him to this city many scientists from his team at NCL. Cipla then started an on-going sponsored collaboration with RRL. In 1988, RRL was renamed IICT and our association with Dr. Rama Rao continued to blossom. Two anti-cancer drugs developed here were Etoposide and Mitoxantrone. Then a major successful IICT project that was a turning point for Cipla was the first manufacture and introduction in India of the fluoro-quinolone antibiotics, Norfloxacin in 1987 and later Ciprofloxacin. We also took up the manufacture in 1990 of Omeprazole developed by IICT. Apart from this, his group at IICT developed many processes for us and other pharma companies, which included Astemizole, Flurbiprofen, Gemfibrozil, Imipenam, Ketorolac, Ketotifen, Mefloquin, Sulbactam, etc. In the mid-1990's, one of Dr. Rama Rao's protégé, Dr. M. Gurjar returned to NCL as Deputy Director and our association with NCL expanded and continues successfully as of date.

Dr. Rama Rao retired from IICT in 1995 and we carefully discussed his future. He was still young and vibrant with a very active mind. On 15th August 1995, he started Avra Lab. This Company over the past 10 years has become one of the leading contract research laboratories in the country. It concentrates essentially in three areas – synthesizing building blocks for new chemical entities; secondly, it does innovative

process chemistry and finally of interest to companies such as Cipla, Avra Lab. also produces advanced intermediates for many valuable newer drugs such as Bicalutamide, Irinotecan and Mifepristone. Our association, both technical and commercial continues and is in good hands with the involvement of his two bright sons, Ramakrishna and Chandra.

In 1991, a meeting between Dr. Rama Rao and myself led to a landmark development. He was then working on the synthesis of Zidovudine, commonly called AZT, which at that time was the only available monotherapy drug for treating HIV and AIDS. He had also on his own convinced the Government to allow importation of the starting material Beta Thymidine into the country without duty. With his persistence and encouragement, Cipla started commercial production of AZT in 1993 and marketed the 100 mg capsule formulation at one sixth of the then prevailing international price.

In 1996, a breakthrough study showed that a cocktail of three anti-retroviral drugs was more effective in controlling and managing HIV and AIDS. This had a dramatic impact in the treatment of this dreaded disease. Being HIV positive was no longer a death sentence, but rather could be treated as any other chronic ailment. The three-drug combination could vary, and at that time the combined price for such combinations was around US\$12,000 per patient per year. This was simply unaffordable in third world countries, especially in sub-Saharan Africa. Cipla took up this challenge and offered the world's first triple single drug cocktail Triomune at a price of less than US\$ 1 per patient per day. With the help and assistance of

Dr. Rama Rao and his team in IICT and later with Dr. Gurjar and his team in NCL, we have jointly developed innovative processes for many of the wide range of anti-retroviral drugs used in therapy today such as Efavirenz and Tenofovir.

Our criteria for a triple drug cocktail was based on quality, safety, efficacy, affordability and sustainability of supply. Cipla now offers many suitable triple-drug cocktails internationally, the latest pricing being in the region of US\$ 150 per patient per year, for a combination consisting of Lamivudine, Stavudine and Nevirapine. Cipla supplies free, worldwide, a single dose formulation of the ARV drug Nevirapine capable of preventing the transmission of HIV from Mother to Child. Apart from this, we have offered totally free, the technology to produce both bulk actives and formulations of all ARVs to any third world Government wishing to undertake its own manufacture. You would be interested to know that our Company alone is today catering to the needs of approximately 120,000 HIV positive patients worldwide and we supply our ARV drugs to 90 countries and specifically our triple drug cocktails including Triomune to 43 countries. This major drive by Cipla and 6 other leading Indian companies owes its origin to Dr. Rama Rao and I would like to take this opportunity to thank him profusely for this on behalf of the HIV afflicted population worldwide.

All the suffering and death from war, famine and natural disasters in the 20th century will be eclipsed by HIV and AIDS in the 21st century. The HIV virus has already killed 22 million people worldwide during the past 20 years. The UN has recently estimated that 80 to 90 million Africans

will die of AIDS by 2025. AIDS eats deep into our lives and spares nobody. It transcends all nationalities, race, religion, social and political boundaries. It is the first disease ever to be labeled a global killer by the UN Security Council. It is a grave existing danger with catastrophic consequences for the human race. We need the will and courage to fight the crisis with all the energy and resources at our command. With so much God given life at stake, this is one battle the human race cannot afford to lose.

In recent years, the HIV and AIDS issue has raised the much wider subject of access to medicines at affordable prices, especially in the third world. In my personal opinion, one of the greatest predictable tragedies the world has witnessed started in India on 26th December 2004 with the ordinance amending the Indian Patents Act 1970. It will deprive the poor of India and the third world, medicines they need to survive. It will divide the human race between those that can afford life-saving drugs and those that cannot – a systematic denial to the 3 billion in the poorer nations to help their own people and shape their own destiny.

This is not an occasion to discuss the WTO and TRIPS issue, except to say that the Governments' recent decision leaves much to be desired. India's future generations will be the ultimate judges of this. No right-thinking person can claim that there has been a dramatic improvement in the standard of living for the majority of Indians during the last three decades, certainly not to the extent of warranting a change in pharma patent laws.

The fact is that healthcare in India has always been in a state of perpetual crisis. The disease profile is frightening:

80 million cardiac patients, 80 million afflicted with mental illness, 60 million diabetics, 50 million asthmatics, 50 million hepatitis B cases, and one in three Indians is a latent carrier of TB. The World Bank has said that India will have 35 million HIV cases by 2015, approximately half of all the AIDS cases in the world. Given these facts, the patent regime in this country should be so devised that utmost priority is given to secure the people's right to access affordable quality healthcare without monopoly. This can be achieved by an automatic license of right with a suitable royalty payment on nett sales to the innovator. Even a developed country like Canada followed this policy from 1969 to 1992 under the Canadian bill S-91.

Apart from this, if at all, the Government should only allow patents filed post 1st January 2005 as product patents. Also problems such as evergreening and frivolous patenting should be carefully reviewed. Compulsory licensing provisions have to be favourable for the indigenous industry, as also patenting by Indians internationally. Importation of a patented product alone should not be considered as operative working of a patent. We need to take a closer look as to what is best for India. One cannot have the same laws for 600 million people in the developed world and 3 billion people in the third world. Globalization of healthcare does not mean that the sick and needy are denied access to drugs at affordable prices.

The world has shrunk dramatically. Globalisation can best be understood by the query as to how long it took Spain to find out that Christopher Columbus had discovered America – 7 months. How long did it take for London and Paris to find out that Abraham Lincoln had been

assassinated in the USA – 7 weeks. Today, we can witness instantly what is happening anywhere in the world. The power of globalisation is being felt in our Pharma Industry as well, with all major Indian companies looking at global opportunities.

In conclusion, I believe that we must try and understand issues on a much more broader scale than perhaps we do and hence I would like to convey a message to the younger generation that will follow us.

If anything is important in life, it is the future. The past is gone forever and the present exists only as a fleeting moment. Everything that we think and do from this moment on can affect only the future. It is the future in which we will be spending the rest of our shrinking life. With growing complexities, increasing population, worldwide poverty, disease, crime, drugs, racial disparity, political and economic upheavals within the country and globally, it becomes extremely difficult to make rational decisions required for charting not only one's own future, but that of companies and Industry. However, this needs to be done and done objectively on an on-going basis and updated from time to time. The younger generation must therefore embrace two important values. These are:

Imagination -- one of the qualities that differentiates people, and in particular scientists. However, there is one quality far more important, and that is

Enthusiasm -- the feeling that what one is pursuing in life is the only thing that really matters.

On a lighter vein, I would like to share with you an old academic joke “a philosopher is a person who knows less and less about more and more, until he knows nothing about everything; a scientist is a person who knows more and more about less and less, until he knows everything about nothing”. In the pharma industry, we therefore have to tread a middle path between that of a philosopher and a scientist, such as that followed over the years by Dr. Rama Rao.

On an occasion such as this, honouring Dr. Rama Rao who has played a key role in the development of the Indian Pharma industry, I would like to endorse the following:

As Indians, we want each and everyone of our countrymen to have access to healthcare and medication at affordable prices. We dream of an India where every citizen can share a decent quality of life. We are all committed to this dream and pledge our fullest co-operation and support to our government and our country to fulfil this Herculean task.

“Ladies and gentlemen, let us all wish Dr. Rama Rao, Mrs. Rama Rao and his family the very best for his 70th birthday and pray that his vigour and youthfulness may endure for years and years to come and that he will succeed in scoring a century at the wicket of life”.

Thank you,

Top 50 companies in the Retail Pharmaceutical Market in India-ORG MARG (1971)

December 1971 (Moving Annual Total)						
2004 Rank	1996 Rank	1971 Rank	Sector	Value Rs. Mi	% MS	
221	11	1	SARABHAI	M 160	9.62	
2	1	2	GLAXO	M 121	7.26	
20	4	3	PFIZER	M 113	6.76	
17	6	4	ALEMBIC	I 81.9	4.91	
	9	5	HOECHST	M 80.8	4.85	
	37	6	LEDERLE	M 56	3.36	
	18	7	CIBA	M 48.9	2.93	
	21	8	MAY & BAKER	M 42.6	2.56	
33	13	9	PARKE DAVIS	M 39.9	2.39	
9	47	10	ABBOTT	M 37	2.22	
	45	11	SHARP & DOHME	M 36	2.14	
18	22	12	SURJID GIGY	M 34.9	2.09	
58	53	14	UNICHEM	I 34.6	2.08	
	34	15	EAST INDIA	I 33.7	2.02	
	85	16	SANDOZ	M 33.3	2	
128	68	17	DEY'S	I 32.1	1.93	
		18	BOOTS	M 32.1	1.93	
		18	TCF	I 30.1	1.81	
	13	19	WARNER HINDUSTAN	M 28.1	1.69	
	19	20	JOHN WYETH	M 27.7	1.66	
38	40	21	RAPTIKOS BRETT	I 26.8	1.61	
		22	ROCHE	M 26.3	1.58	
27	24	23	GERMAN REMEDIES	M 22.5	1.35	
29	16	24	F. MERCK	M 22.1	1.33	
	14	25	S.KLINE & FRENCH	M 20.9	1.25	
		26	RICHARDSON HIND.	M 19.9	1.19	

M - MNC I = INDIAN % MS - % MARKET SHARE Mi - Million

December 1971 (Moving Annual Total)						
2004 Rank	1996 Rank	1971 Rank	Sector	Value Rs. Mi	% MS	
		27	BDI	M 18.9	1.13	
		28	BURROUGHS WELLS	M 17.2	1.03	
	131	29	GEORGEY MANNERS	M 16.2	0.97	
	47	35	INFAR	M 16	0.96	
	31	25	HIMALAYA	I 15.9	0.95	
	6	32	BOEHRINGER KNOLL	M 15.3	0.92	
		33	STANDARD	I 15.3	0.92	
	70	63	BAYER	M 14.1	0.85	
		35	ANGLO FRENCH	M 14.1	0.85	
		36	INDIA SCHERING	M 14	0.84	
		37	FRANCO INDIA	I 12.6	0.76	
		38	BENGAL IMMUNITY	I 12.2	0.73	
		39	BIOLOGICAL EVANS	M 11.6	0.7	
	54	40	DUPHAR	M 11.3	0.67	
		41	WOODWARDS	M 10.9	0.65	
	119	65	THEMIS	I 10.2	0.61	
	3	43	RANBAXY	I 9.9	0.59	
		44	INDON	I 9.8	0.59	
	114	45	NEL PHARMA	I 9.4	0.56	
	30	46	US VITAMINS	M 9.3	0.55	
	32	4	FRANCO INDIA	I 9.1	0.55	
		48	ETHNOR	M 8	0.48	
	23	29	FDC	I 7.6	0.46	
		50	GRIMAUULT	I 7.2	0.43	
TOTAL					1538	92%

M = 33 I = 17 % MS (M): 70% % MS (I): 22% + Bal 8% - 30%

Top 50 companies in the Retail Pharmaceutical Market in India-ORG MARG (1996)

July 1996 (Moving Annual Total)						
1971 Rank	2004 Rank	1996 Rank	Sector	Value Rs. Mi	% MS	
2	2	1	GLAXO WELLCOME	M	4836	7.06
		2			CIPLA	I
43	3	3	RANBAXY	I	2686	3.92
3	20	4	PFIZER	M	1721	2.51
		5			KNOLL	M
4	17	6	ALEMBIC	I	1664	2.43
		7			TORRENT	I
5	12	8	LUPIN	I	1536	2.24
		9			HOECHST ROUSSEL	M
1	221	4	NICHOLAS PIRAMAL	I	1363	1.99
		11			AMBALAL SARABHAI	M
1	33	12	CADILA HEALTH	I	1323	1.93
		13			PARKE DAVIS	M
25	14	14	SMITHKLINE	M	1106	1.61
		15			ARISTO	I
24	29	16	E MERCK	M	1070	1.56
		22			CADILA	I
4	20	18	HINDUS CIBA GEIGY	M	1009	1.47
		19			JOHN WYETH	M
8	14	20	WOCKHARDT	I	998.1	1.46
		21			RHONE-POULENC	M
13	18	22	UNICILUM	I	931	1.36
		23			ALKEM	I
23	27	24	GERMAN REMEDIES	M	895	1.31
31	31	25	HIMALAYA	I	882	1.29
		30			IPCA	I

M = MNC I = INDIAN % MS = % MARKET SHARE Mi = Million

Top 50 companies in the Retail Pharmaceutical Market in India-ORG IMS (2004)

December 2004 (Moving Annual Total)						
1971 Rank	1996 Rank	2004 Rank	Sector	Value Rs. Mil.	% MS	
	2	1	CIPLA	I	11285	5.51
2	1	2	GLAXO SMITHKLINE	M	11143	5.44
43	3	3	RANBAXY	I	9190	4.48
	10	4	NICHOLAS PIRAMAL	I	8720	4.22
	27	5	SUN	I	6738	3.29
	32	6	DR. REDDY'S	I	4988	2.43
		7	ZYDUS-CADILA	I	4959	2.42
	15	8	ARISTO	I	4760	2.32
10	47	9	ABBOTT	M	4735	2.31
	23	10	ALKEM	I	4477	2.18
		11	AVENTIS	M	4367	2.13
	8	12	LUPIN	I	4165	2.03
	50	13	MICRO	I	3903	1.90
	20	14	WOCKHARDT	I	3776	1.84
	7	15	TORRENT	I	3747	1.83
		16	NOVARTIS	M	3725	1.82
4	6	17	ALEMBIC	I	3432	1.67
13	22	18	UNICHEM	I	3430	1.67
46	30	19	U.S.V.	I	3390	1.65
3	4	20	PFIZER	M	3274	1.60
		21	INTAS	I	2861	1.40
	17	22	CADILA PHARMA	I	2684	1.31
49	29	23	FDC	I	2665	1.30
	44	24	GLENMARK	I	2652	1.29
20	19	25	WYETH	M	2576	1.26
		26	MANKIND	I	2514	1.23

M = MNC I = INDIAN % MS = % MARKET SHARE Mi = Million M = 13

July 1996 (Moving Annual Total)						
1971 Rank	2004 Rank	1996 Rank	Sector	Value Rs. Mi	% MS	
	5	27	SUN	I	722.1	1.05
	54	28	FULFORD (I)	M	673	0.98
49	23	29	FDC	I	672	0.98
46	19	30	USV	I	599	0.87
37	32	31	FRANCO INDIA	I	595	0.87
	6	32	DR RUDDY'S	I	557	0.81
	55	33	HEINZ (I)	M	533	0.78
15		34	SANDOZ	M	519	0.76
30	47	35	INFAR	M	517.5	0.76
	94	36	LYKA	I	515	0.75
6		37	LEDERLE	M	503.5	0.73
39		38	BIOLOGICAL E.	M	498	0.73
		39	J.B. CHEM.	I	495	0.72
21	38	40	RAPTAKOS BRETT	I	493	0.72
32	41	41	BOEHRINGER M.	M	485	0.71
	204	42	GUPIC	I	481	0.7
48		43	ETHNOR	M	473	0.69
		44	GLENMARK	I	460.2	0.68
11		45	MERIND	I	444	0.65
		46	CROSSLANDS	I	440	0.64
10	9	47	ABBOTT	M	439	0.64
		48	ASTRA IDI.	M	427	0.62
	34	49	ELDER	I	417	0.61
	13	50	MICRO	I	416	0.61
TOTAL				49867	73%	

M = 22 I = 28 % MS (M): 34% % MS (I): 39% + Bal 27%=66%

December 2004 (Moving Annual Total)						
1971 Rank	1996 Rank	2004 Rank		Sector	Value Rs. Mi	% MS
23	24	27	GERMAN REMEDIES	I	2369	1.16
		28	MACLEOD'S	I	2333	1.14
24	16	29	E MERCK	M	2304	1.12
	26	30	IPCA	I	2281	1.11
31	25	31	HIMALAYA	I	1871	0.91
37	31	32	FRANCO INDIA	I	1822	0.89
9	13	33	PARKE DAVIS	M	1638	0.80
	49	34	ELDER	I	1630	0.80
		35	INDOCO	I	1615	0.79
		36	ASTRA ZENECA	M	1514	0.74
		37	EMCURE	I	1489	0.73
21	40	38	RAPTAKOS BRETT	I	1264	0.62
		39	SOLVAY	M	1110	0.54
		40	JANSSEN CILAG	M	1106	0.54
		41	DABUR	I	1086	0.53
		42	BLUE CROSS	I	1051	0.51
	39	43	J.B.CHEM.	I	1048	0.51
		44	JAGSON PAL	I	1045	0.51
		45	WIN MEDICARE	I	1021	0.50
		46	SHREYA LIFE SCIEN	I	1015	0.49
30	33	47	INPAR	M	991	0.48
		48	PANACEA BIOTECH	I	985	0.48
		49	PARAS	I	982	0.48
		50	PROCTER & GAMBLE	M	964	0.47
TOTAL					158639	77%

I = 37 % MS (M): 19% + Bal 3% = 22% % MS (I): 58% + Bal 20% = 78%

**Market Shares of MNCs and Indian companies
in the Pharmaceutical Industry in India
(1952-2004)**

Year	MNC (% MS)	Indian companies (% MS)
1952	38	62
1970	68	32
1971	70	30
1978	60	40
1980	50	50
1991	40	60
1996	34	66
1998	32	68
2002	25	75
2003	23	77
2004	22.7	77.3

Source: Chaudhuri, "The WTO and India's Pharmaceutical Industry (Forthcoming, 2005)
MNCs= MULTINATIONAL COMPANIES % MS=% Market Share

Pharmaceutical MNCs in India, 2004

NO.	Rank	COMPANY	No. of prods.	Value Rs./Mi	% MS
1	2	GLAXO SMITHKLINE	207	11143.3	5.44
2	9	ABBOTT	87	4734.5	2.31
3	11	AVENTIS	44	4367.1	2.13
4	16	NOVARTIS	127	3725	1.82
5	20	PFIZER	30	3273.6	1.6
6	25	WYETH	59	2575.9	1.26
7	29	E MERCK	59	2304.1	1.12
8	33	PARKE DAVIS	48	1638.3	0.8
9	36	ASTRA ZENECA	45	1514.5	0.74
10	39	SOLVAY	26	1109.8	0.54
11	40	JANSSEN CILAG	45	1105.7	0.54
12	47	INEAR	39	991.3	0.48
13	50	PROCTER & GAMBLE	9	964.4	0.47
14	54	FULFORD (I)	29	834.5	0.41
15	55	HEINZ (I)	5	803.7	0.39
16	57	EL-LILLY	17	779.3	0.38
17	64	SB CONSUMER HEALTH	5	633.2	0.31
18	67	SERDIA	9	614.4	0.3
19	70	BAYER	20	605.7	0.3
20	80	UCB	14	499.9	0.24
21	83	SANOFI SYNTHELABO	16	474	0.23
22	99	PHARMACIA (I)	19	335.3	0.16
23	101	RECKITT & COLMAN	8	341	0.17
24	103	PHARMACIA HEALTH CARE	29	318.1	0.16
25	107	JOHNSON & JOHNSON	24	282.8	0.14
26	108	WALTER BUSHNELL	13	273.8	0.13
27	140	GALDERMA	10	157.5	0.08
28	174	GEOFFREY MANNERS	2	93.9	0.05
29	273	3M	2	9.3	0.005
30	282	KNOLL	12	4.1	0
31	298	NUTRICIA	4	0.3	0
32	300	HINDUSTAN LEVER	11	0.1	0
		TOTAL		46508.6	22.7

Source: ORG IMS
MNCs= MULTINATIONAL COMPANIES Mi: Millions %MS=% Market Share

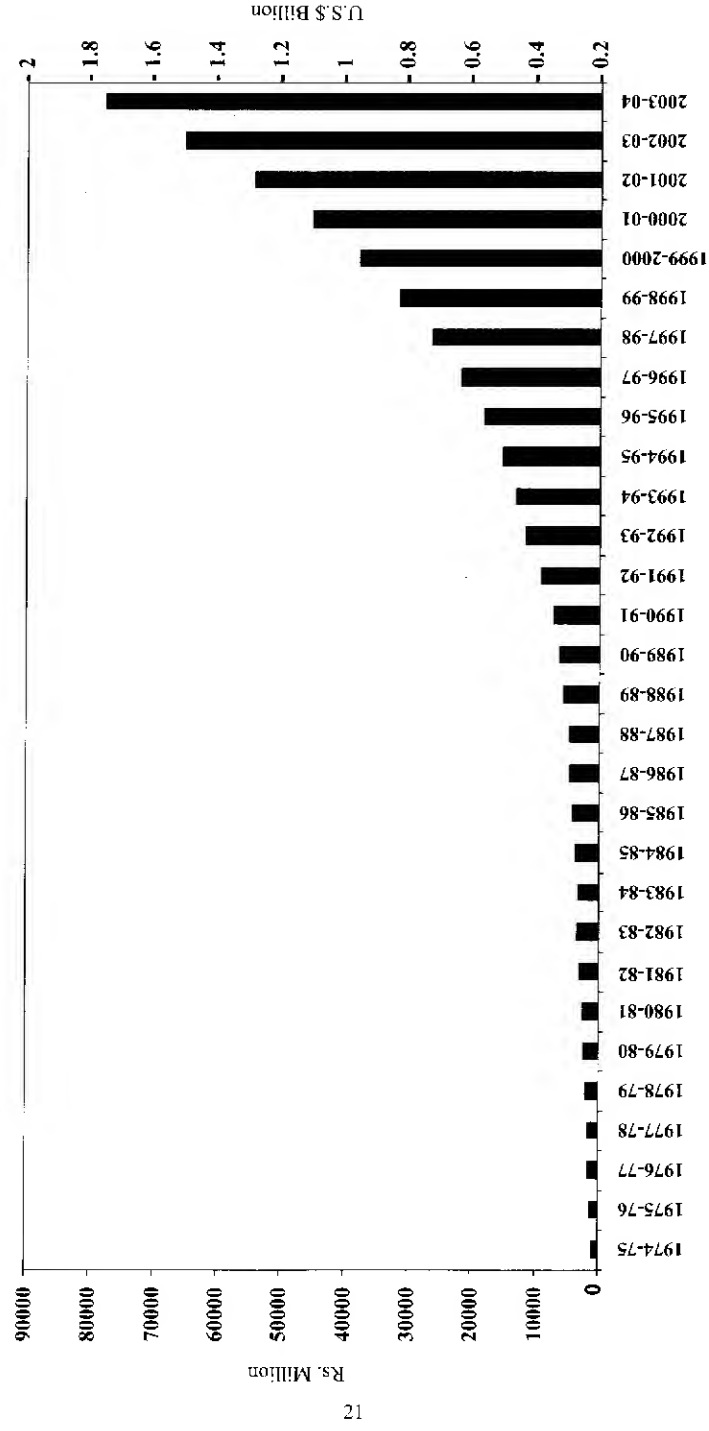
Production of Bulk Drugs (API's) and Drug Formulations in India (1947-2004)

Year	Bulk Drug Production (Rs million)	Formulation Production (Rs million)
1947		100
1952		350
1958		540
1960		700
1962		1000
1964	170	1350
1966		1750
1968		2000
1969		2350
1970		2500
1971		3000
1972		3600
1973		3800
1974-75	900	4000
1975-76	1300	5600
1976-77	1500	7000
1977-78	1640	9000
1978-79	2000	10500
1979-80	2260	11500
1980-81	2400	12000
1981-82	2890	14300
1982-83	3450	16600

Year	Bulk Drug Production (Rs million)	Formulation Production (Rs million)
1983-84	3080	17600
1984-85	3650	18270
1985-86	4090	19450
1986-87	4580	21400
1987-88	4800	23500
1988-89	5500	31500
1989-90	6400	34200
1990-91	7300	38400
1991-92	9000	48000
1992-93	11500	60000
1993-94	13200	69000
1994-95	15180	79350
1995-96	18220	91250
1996-97	21860	104940
1997-98	26230	120680
1998-99	31480	138780
1999-2000	37770	158600
2000-01	45330	183540
2001-02	54390	211040
2002-03	65290	241850
2003-04	77790	276920

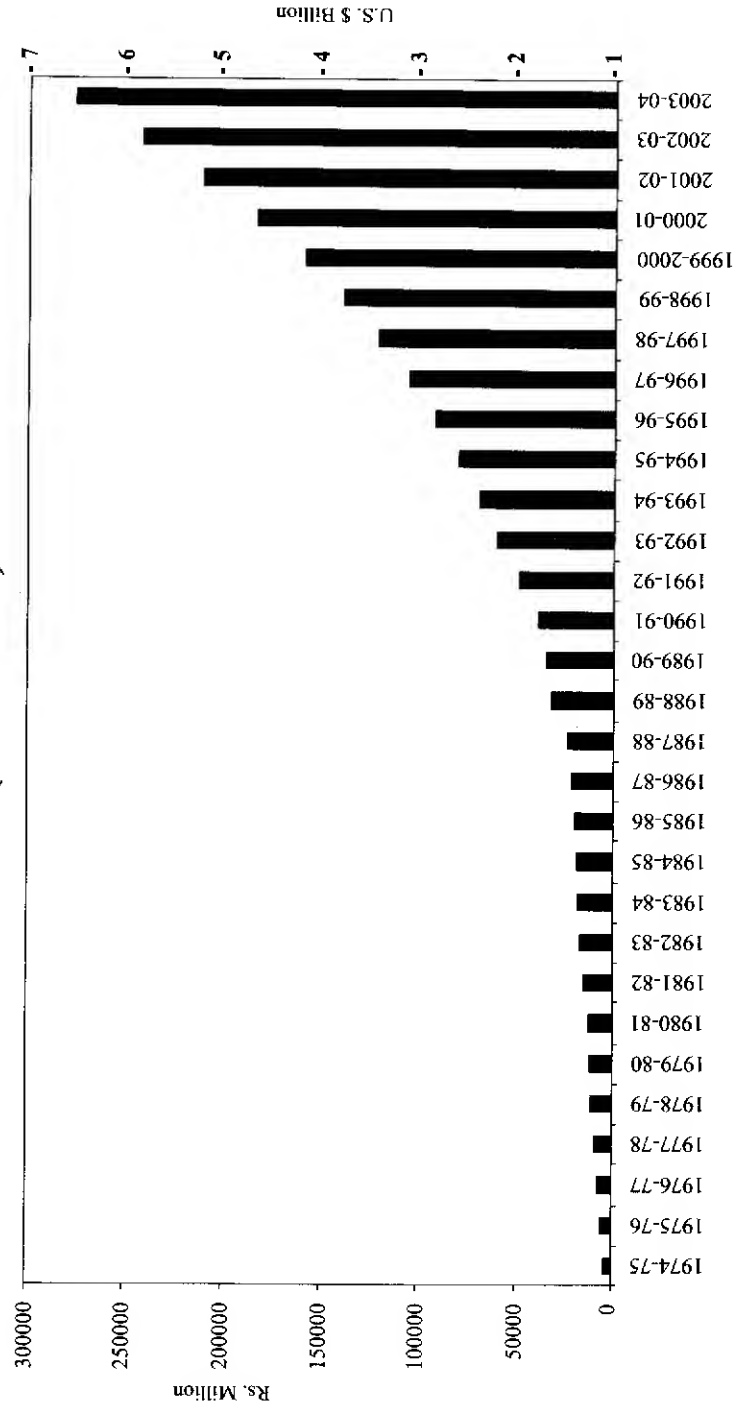
Source: Chaudhuri, "The WTO and India's Pharmaceutical Industry" (Forthcoming, 2005)

Growth in Bulk Drugs (API's) Production in India (1974-2004)



Source: Chaudhuri, "The WTO and India's Pharmaceutical Industry" (Forthcoming, 2005)

Growth in Drug Formulations Production in India (1974-2004)



Source: Chaudhuri, "The WTO and India's Pharmaceutical Industry" (Forthcoming, 2005)

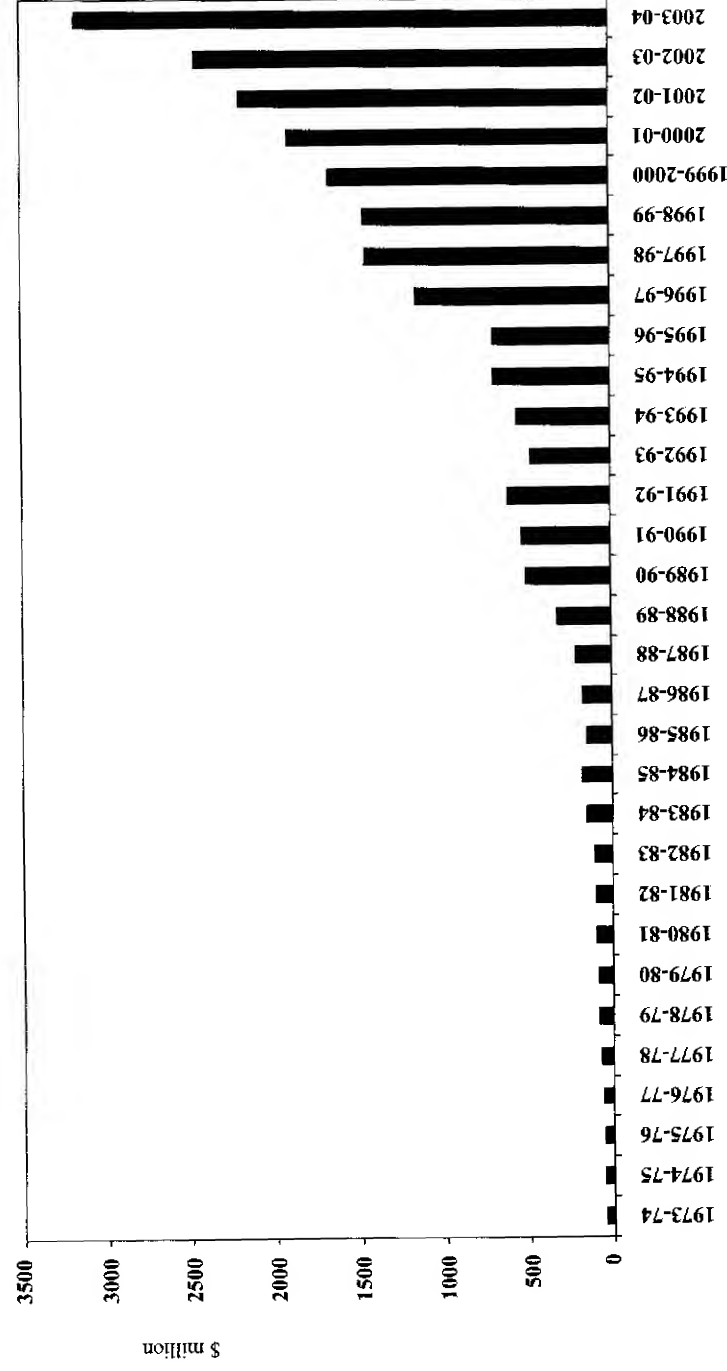
Total Value of Exports from India and Imports into India of Bulk Drugs (API's) and Drug Formulations (1973-2004)

Year	Total exports \$ Million	Total imports \$ Million	Trade balance (col 2-col 3)	Trade balance as % of exports
1973-74	47.9	43.8	4.1	+8.5
1974-75	54.3	59.1	-4.7	-8.7
1975-76	48.7	53.0	-4.3	-8.9
1976-77	60.3	60.3	-0.0	-0.1
1977-78	70.8	96.0	-25.2	-35.6
1978-79	83.9	115.9	-32.0	-38.1
1979-80	87.9	148.2	-60.4	-68.7
1980-81	96.3	142.6	-46.3	-48.1
1981-82	106.4	152.5	-46.1	-43.3
1982-83	114.9	153.6	-38.7	-33.7
1983-84	156.5	158.0	-1.5	-0.9
1984-85	182.9	181.4	1.6	+0.9
1985-86	158.9	218.6	-59.7	-37.6
1986-87	174.5	225.1	-50.6	-29.0
1987-88	223.4	269.5	-46.1	-20.6

Year	Total exports \$ Million	Total imports \$ Million	Trade balance (col 2-col 3)	Trade balance as % of exports
1988-89	322.9	308.6	14.3	+4.4
1989-90	514.6	391.7	122.9	+23.9
1990-91	536.6	336.6	200.0	+37.3
1991-92	613.7	329.9	283.8	+46.2
1992-93	486.2	371.1	115.1	+23.7
1993-94	567.9	459.1	108.8	+19.2
1994-95	694.0	486.3	207.7	+29.9
1995-96	698.7	558.1	140.5	+20.1
1996-97	1152.1	664.2	487.9	+42.3
1997-98	1458.1	729.5	728.6	+50.0
1998-99	1462.3	724.3	738.0	+50.5
1999-2000	1668.5	346.6	1321.9	+79.2
2000-01	1910.9	444.9	1466.0	+76.7
2001-02	2196.6	541.2	1655.3	+75.4
2002-03	2464.1	527.8	1936.3	+78.58
2003-04	3177.3	686.7	2490.6	+78.30

Source: Chaudhuri, "The WTO and India's Pharmaceutical Industry" (Forthcoming, 2005)

Growth in Exports of Bulk Drugs (API's) and Drug Formulations from India (1973-2004)



Source: Chaudhuri, "The WTO and India's Pharmaceutical Industry" (Forthcoming, 2005)